

A Solar-Powered Fleet Tracking System for Rural IoT Applications
(Technical Report)

Rural Electric Cooperatives' Role in the Energy Transition
(STS Research Paper)

An Undergraduate Thesis Portfolio
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Bachelor of Science in Electrical Engineering

by

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Preface

How can rural communities achieve economic and technological revitalization?

Technologies can widen economic and social divides between rural and urban communities. Developments in the Internet of Things (IoT) and clean energy technologies provide an opportunity to lessen this gap.

How can the IoT better serve rural areas? IoT devices have been battery-powered and communicate through existing networks. Such devices can be difficult to deploy in rural areas because of the maintenance burden of primary cell batteries and poor network infrastructure. Solar energy harvesting and LoRa (long range) modulation are emerging IoT methods that can surpass limitations in rural reliability for the IoT. The Fleet Tracker is a distributed solar-powered GPS tracking system that uniquely uses both of these techniques, acting as a proof of concept for improved reliability in the IoT.

How do rural electric cooperatives impact the energy transition in the United States?

Rural electric cooperatives support the energy transition through projects that revitalize local economies and lower members' utility bills. These include energy efficiency upgrades and community solar. These projects demonstrate that global movements must find connections to local communities. Rural electric cooperatives act as a bridge between the global goal of mitigating climate change and local economic needs.

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